Illinois Environmental Protection Agency
Fact Sheet for Radionuclides in Drinking Water

To ensure that all customers of community water systems receive water that meets the maximum contaminant levels (MCLs) for radionuclides, USEPA has revised the 1976 radionuclides regulation. USEPA also has publicized a new 30 ug/L standard for uranium. The other standards are: a combined standard for radium-226 and radium-228 of 5 pCi/L; a gross alpha standard for all alpha emitters of 15 pCi/L (not including radon and uranium); and a standard of 4 mrem/year for beta particle and photon radioactivity which applies only to supplies vulnerable to this type of contamination.

Another provision of the rule requires that monitoring be performed such that all water entering the distribution system is tested for radionuclides. Under the old rule, community water systems only tested water from "representative points" in the distribution system. The old monitoring requirements did not protect every customer, since water quality may vary throughout the distribution system.

The rule currently applies to all community water systems, which are water systems with at least 15 service connections or that serve 25 or more persons year-round.

What are radionuclides?

Radionuclides are unstable chemical compounds. As these compounds stabilize, they emit particles and/or "ionizing" radiation of varying degrees (alpha, beta, or the most powerful gamma emission). There are approximately 2,000 known radionuclides. Generally, these can be classified in two categories: naturally occurring and man-made.

The radionuclides found in Illinois wells are naturally occurring, and are largely alpha emitters with some beta emitters. The most significant natural radionuclides in Illinois drinking water (determined by occurrence and potential to cause adverse health effects) are radium-226 and radium-228. Occasionally, other alpha emitting radionuclides are found in drinking water.

Why do radionuclides occur in drinking water?

Certain rock formations contain naturally occurring radionuclides. In Illinois, they are mainly found in deep bedrock aquifers in Northern Illinois. Over time, these radioactive elements dissolve into water that is also pumped for drinking.

Most drinking water sources have very low levels of radioactive contaminants ("radionuclides"). These very low levels are not considered to be a public health concern. Of the small percentage of drinking water systems with radionuclides exceeding the MCL's, most of the radioactivity is naturally occurring. Some parts of the mid-West, including Illinois, have significantly higher than average combined radium–226 and radium-228 levels.

What are the health effects?

During decay, all radionuclides emit "ionizing radiation," a known human carcinogen. Long-term exposure to this radiation in drinking water may cause cancer. Short-term exposure to naturally occurring radionuclides poses little or no health risk at levels found in Illinois drinking water. Exposure to uranium in drinking water may cause toxic kidney effects. In Illinois, we do not anticipate having any water supplies exceed the uranium MCL.

Can radionuclides be removed from a community water system?

Supplies that exceed a radionuclide standard are required to reduce the level below acceptable limits. This can be done in a variety or ways, such as: installation of mechanical treatment to remove the radionuclide from the water; blend high-level radionuclide water with low-level radionuclide water (dilute); connect to another local water supply, or drilling new wells into a radionuclide-free water source.

All the options listed above are complex, require a lot of planning and permits, and are usually expensive. Water systems must study each option and determine which is most effective, both mechanically and financially for their situation.

How can I find out if my water contains elevated levels of radionuclides?

The concentration of radionuclides in your drinking water is listed in your water supply's annual Consumer Confidence Report (CCR). The CCR is an annual drinking water quality report that identifies all the contaminants found in your drinking water. To obtain a copy of your most recent CCR, contact your local water department. In addition, any water supply that exceeds a radionuclide standard is required to issue a quarterly public notice to every customer as long as the condition exists. Public notification copies can also be obtained from your local water department.

Rule Summary			
Contaminant	MCL	Source	Health Effect
Combined radium-226/-228	5 pCi/L	Naturally occurs in some drinking water sources.	Some people who drink water containing combined radium in excess of the MCL over many years may have an increased cancer risk.
(Adjusted) Gross Alpha	15 pCi/L (minus radon & uranium)	See above	See above
Beta Particle and Photon Radioactivity	4 mrem/year	Contamination from facilities using or producing radioactive materials.	Some people who drink water containing beta/ photon emitters in excess of the MCL over many years may have an increased cancer risk.
Uranium (an alpha emitter)	30 μg/L	Naturally occurs in some drinking water sources.	Exposure may result in toxic effects to the kidney. Some people who drink water containing uranium in excess of the MCL over many years may have an increased cancer risk.

For more information contact: IL EPA Drinking Water Compliance Unit at 217-785-0561, USEPA Safe Drinking Water Hotline at 1-800-426-4791 or website www.epa.gov/safewater/rads/implement.html.

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